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formed and interlinked. It appears that with superior technical capabilities and virtually no government restrictions, the PCP operations might produce significant competition to the operations of existing RCCs.

WHY DO ESTABLISHED RCC's USE PCP?

Existing RCC operators saw PCP as a means to provide low-cost, very flexible paging. For example, in order for an RCC operator in a regulated state such as West Virginia to change its rates, at worst it could require a full rate hearing. Any rate change would then have to be acted upon and reported and in general produces a heavy burden on the RCC.

The PCP carrier has none of these encumbrances. For example, different prices could be charged to different people all at the same time. Rates could change daily and in general, there is unrestricted movement with respect to prices, transmitter locations and state regulatory agencies.

It appears to me that the only other major difference between PCP and RCC systems is the requirement that PCP operations share their channels with each other. An RCC operation has a guaranteed service area which is protected from interference by federal regulation.

A PCP operator must share the channel. There is very little federal definition concerning the method or mechanism by which a channel is shared but most licensees on 152.48 MHz have reached some accommodation in an effort to

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COMPANY, INC.**

maximize the amount of traffic which may be passed. Obviously, channel traffic produces PCP income.

Channel sharing by its very nature reduces the amount of channel time available to each of the sharing entities and thus potentially caps income in addition to degrading service. It must be remembered that at the time of this case there was only one channel which would fit the needs in this region (Other VHF channels and a few UHF channels were available for PCP operation, but were at either undesirable frequencies or had severe power restrictions.) These conditions made it quite natural that the 152.48 MHz channel would experience tremendous growth and that with a large number of subscribers, networking would become a profitable process. For operators who had a large number of subscribers on a channel, it is also inevitable that they do whatever is necessary or whatever they can to protect their business interests. However, once an incumbent PCP licensee builds a substantial customer base, it is natural that sharing will be detrimental to its interests. **RAM's reaction** and responses in this case could easily fit such a non-sharing definition.

It is also natural that any new entities endeavoring to provide PCP services would attempt to select 152.48 MHz because of its established market and the potential to link to other regions to become large area paging systems. Had Capitol asked me to recommend a frequency for possible PCP paging at the time that they applied for their license, I would have recommended that they operate on 152.48 MHz, just as they did. If they asked me that question today, I would recommend the same frequency for the same reasons

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Many of my clients simply use the PCP services as low-cost paging alternatives which sometimes could utilize surplus equipment which had long ago been amortized. For example, many operators could utilize paging transmitters and receivers which they had on hand from different services and different times. Tone and voice pagers have not been used very frequently on RCC channels in recent years due to channel overcrowding. These retired receivers could be used on PCP frequencies.

HOW DOES AN RCC START A PCP OPERATION

In everyday interactions with clients, there have been numerous reasons discussed for starting PCP operations and services. A number of RCC operators have undertaken PCP operations in a very cautious manner. This seems mainly to be because RCC operators are totally unacquainted with the channel sharing concepts which could be perceived to produce a less than desirable grade of service to their subscribers. It should be remembered, since RCC operations are protected from interference, that RCC operators have striven to provide high-quality service and are accustomed to this aspect of radio paging. PCP operations require that the channel be shared with no provision as to how the channel should be shared. This uncertainty has conjured fearful thoughts in many RCC's minds of happily operating on a frequency and one day waking to find massive amounts of interference and hundreds or thousands of disgruntled subscribers. Consequently, many RCCs have begun PCP operations in a very

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conservative manner, very much in the manner that Capitol started their PCP operation. That is, start with a minimum of equipment which is either on hand or can be obtained inexpensively. Until all of the aspects of frequency sharing are understood and within the control of the RCC operator, do not simply invest a great deal of capital until more is known and until the profit picture can be explored more fully. RCC operators like Capitol generally do have or have access to excess capacity in their systems. For example, a typical paging terminal can easily support the operations of a relatively low capacity PCP channel using one or several transmitters. Once the subscriber load has built sufficiently, new or better equipment can be deployed. Where required, radio links between a paging terminal and various paging transmitters can utilize already existing equipment with little or no modification. Thus, an entire PCP system can be inexpensively created by an RCC.

Channel sharing is generally a large concern. We have advised clients that channel sharing simply means monitor the channel and if it appears busy, do not transmit. This is generally the intent of the FCC regulations and makes good sense. There is, however, an enormous unanswered question that has to do with to what extent one monitors a channel and provides lockout on that channel. Given any defined service area, an operator would lockout his transmitters if they interfered with that service area. In the case of West Virginia, the service areas and target populations are located in narrow, deep valleys. The operator usually installs a mountain top base station transmitter near the desired service area and simply points the antenna at the valley and generally has no trouble serving the

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COMPANY, INC.**

community. In the cases of larger cities, such as Charleston, which ranges along a river valley and into numerous side valleys, this process might require more than one transmitter. The question arises as to where one monitors the channel. If one simply installs a channel monitor at the transmitter site on top of the mountain, one might never receive channel access because the receive range on the mountain top can be 100 miles or more and encompass parts of Kentucky, Ohio and West Virginia. In fact, because of the general terrain it is not unusual to receive usable signals well beyond 100 miles. Normally these signals do not interfere with local operations because once they are diffracted over mountains into the valleys they lose so much energy that they are dwarfed by the local signals. Since a receiver operates on this ratio between desired and undesired signals the long distance signals are rarely disrupting. (There are anomalous propagation conditions where this is not true and those distant signals may interfere but these conditions are so rare as to be not worthy of discussion.)

Channel sharing is critically dependent upon the proper placement of the channel monitor. If that monitor is improperly positioned, it could cause channel access to be unduly restricted as demonstrated in the example above. The other side of this argument is if the channel monitor is not exposed to enough channel information then it could interfere. Learning the correct placement of this channel monitor for all weather conditions and all propagation conditions could be very difficult in the terrain of West Virginia. Correct placement of the channel monitoring device can on the one hand cause a lack of access to the channel and on the other interference to other users on the channel. During this proceeding, the FCC

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sent two field representatives to monitor the stations of Capitol and RAM. It appears that the Capitol monitor was placed in a slightly better position than the RAM monitor. I **conclude this** because of the interference cases observed by the inspectors, 90% were caused by RAM and about 10% caused by Capitol. These were measured results over the air and are not theoretical in any way. In the majority of cases observed by the FCC field personnel, the Capitol channel monitor performed as it was intended.

It is my opinion that reasons for the Capitol lockout monitor working at 90% was caused from one or more transient factors such as local traffic, signal fades and the like. Transient factors will occur no matter where a monitor is placed, even on the mountain top. The monitor must be located at a point which balances channel access with probability of interference.

If Capitol had asked me, and they did not, about how to install a low-cost PCP system, I would have instructed them to start with a small system and allow it to grow before committing to a large investment. It appears that this is precisely the mechanism used by Capitol as it started with easily obtained transmitters and radio link equipment at existing Capitol sites.

CHANNEL SHARING BY CAPITOL AND RAM

Throughout this proceeding there have been allegations made by RAM against Capitol concerning interference and other items allegedly detrimental to RAM. These incidents produced an **inordinate number** of RAM claims at the FCC. As

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COMPANY, INC.**

indicated above, when RAM finally prevailed on the FCC to undertake an investigation of Capitol, the FCC field notes included in this proceeding indicated that of all the cases of channel interference the great preponderance were caused by RAM itself. It is certain from the FCC notes that the RAM-produced interference observed by the FCC inspectors was many times greater than that produced by Capitol. This includes RAM's apparent deliberate disregard of its own channel monitor after a certain time had elapsed. Capitol's channel monitor appeared to be operating well during this period.

In an effort to demonstrate its willingness to share the channel, RAM offered to interconnect terminals with Capitol to provide a channel lock-out process. There are several serious technical difficulties with the RAM proposal and there is even a possibility that the proposed RAM terminal sharing would not provide the desired solution to channel lock-out. For example, because of the natural time delay in processing signals over telephone circuits, if the RAM terminal requested a channel at the same time or nearly the same time as the Capitol terminal, then both terminals could see a channel idle condition and both start transmitting at the same time. The greater the traffic on the channel, the more frequently this condition occurs in systems using this technique. Commonly called a race, there is nothing that can be done to diminish the probability of mutually exclusive transmission except using features which would actually diminish the channel capacity. For example, a terminal might request the channel and wait for the delay time which it takes a signal to travel between Huntington (Ashland) and Charleston before assuming the channel. By rights, the monitor receiver should again look at

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ARTHUR K. PETERS

**CAPITOL RADIOTELEPHONE
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the channel after that elapsed time to verify that there is no existing use of the channel and then it could activate the channel. Each of the paging terminals would require a similar procedure and would obviously slow down the channel and thereby reduce its capacity. All this is very nice except that Capitol would require significant technical modification of its terminal to provide this access. This would be both time consuming and expensive. Thus the RAM proposition to link the terminals by telephone circuits is not totally satisfactory

Another aspect of channel sharing has to do with the specific operations of the two companies in the Huntington and Charleston areas. As a practical matter, these two areas could operate simultaneously and independently without interference depending on the locations of the transmitters involved and how the transmitters are being operated. To have a single lockout process for the combined Huntington and Charleston area could effectively limit the channel capacity by as much as 50% over the potential capacity if both cities were operated independently and simultaneously. Obviously, if an operator chose to operate the two cities simultaneously then that operator would be required to wait until both Huntington and Charleston are idle before utilizing the channel. All-in-all, the concept of channel sharing is neither precise nor trivial. Both the desired service areas and monitoring equipment arrangement must be adequately coordinated to ensure fair and equitable sharing of the channel with minimum limiting of channel capacity. In this proceeding, there did not appear to be an opportunity for correct technical coordination, primarily because of RAM's continuing aggressive attack on Capitol.

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WHY DOES THIS CASE EXIST AT ALL?

I have read the FCC field notes, the results of interrogatories and documents furnished by the FCC to Capitol concerning this case and I do not understand why this case grew as large as it did. I **especially do not understand why it became a Revocation proceeding.** ~~It~~ appears to me that Capitol did everything by the book and, for the most part, correctly.

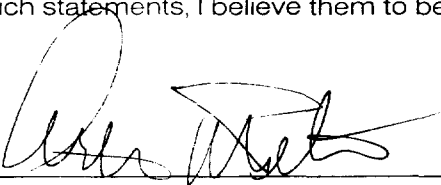
RAM appears to have been concerned about "its channel" since before Capitol was even licensed. Since there was only one channel which was technically superior for operation in its area at the time of its application, Capitol made a correct choice of frequencies and NABER, the FCC's coordinating agency, correctly granted the frequency request specified in the Capitol application. It **seems that RAMs frequent protests and allegations concerning Capitol prompted the FCC field inspection which did not in fact turn up any serious interference situation.** ~~(In fact, RAM interfered considerably more than Capitol during the inspection as mentioned previously.)~~

This case appears to me to be in opposition to traditional FCC practices of pro-competition ~~and~~ channel sharing. It is also my opinion that the genesis of the Capitol PCP system is relatively normal including its implementation difficulties in

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the harsh West Virginia environment. If RAM had genuinely channel shared and the FCC had not intervened there is no doubt Capitol could have proceeded / beyond its system shakedown phase.

I declare, under penalty of perjury, that the foregoing statement and testimony are true and correct to my own knowledge except such statements therein made on information and belief, and as to such statements, I believe them to be true.



Arthur K. Peters, P.E.

January 17, 1994